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SCOPE OF SERVICES

Services to be provided by the Contractor:

1. **General Overview of Services**

    1.1. The Contractor shall provide implementation, training, data storage, ongoing maintenance, and customer service and support of Saab's Aerobahn Service (SMS) along with an airport- wide Multilateration Tracking System (MLAT) at Miami International Airport. Implementation services shall include the installation and configuration all software, system, sub-system and ancillary equipment necessary to provide the services that meets the design, functional, and operations specifications as identified by Miami-Dade Aviation Department (MDAD).

    1.2. The implementation shall be conducted in a 2 phase deployment. In phase 1, the Contractor will implement SMS services using existing FAA Surveillance data feeds to provide situational information to MDAD. In phase, 2, the Contractor will provide expanded surveillance coverage and enhanced product features through the installation and configuration of an independent MLAT system. The Contractor shall provide training, customer service and support, data storage, and ongoing maintenance of the installed SMS and MLAT systems.

2. **Implementation**

    2.1. Upon contract award, the Contractor's team will immediately engage MDAD Project Manager to provide implementation services. The Contractor shall hold regular project status meetings with MDAD. Within 30 days of contract award, the Contractor will conduct a program kick-off meeting with MDAD to define and understand roles and responsibilities, review the program plan/schedule, and confirm key project objectives and goals. The Contractor will furnish MDAD with a detailed design document prior to the installation of any equipment. After acceptance by MDAD of the design document, the Contractor shall hold meetings at least on a semi-annual basis to discuss the systems' status, performance, and any issues.

    2.1.1.   Phase 1 Deliverable - SMS Implementation

    For the initial launch of service, the Contractor will provide SMS to MDAD using ASDE-X surveillance data as available through the FAA's SWIM data services. Upon completion of the MLAT system installation in phase 2, the Contractor will then transition to the more comprehensive data feed to provide situational awareness of targets on the entire airport surface at Miami International Airport including both movement as well as non-movement areas. Access to the Aerobahn Service shall be provided via simultaneous user licenses. These licenses provided by the Contractor will provide MDAD access to the system for the number of users listed in Appendix B - Price Schedule as further specified in Section 11.1.

    2.1.2.   Phase 2 Deliverable - MLAT Implementation

    The Contractor will install a constellation of receivers to provide Mode-S equipped aircraft position tracking information to the SMS System that will cover all of the movement and non-movement areas of the airport surface at Miami International Airport. This will be referred as MLAT. MLAT will provide highly accurate position updates with positive identification for targets from the gates through apron alleyways to airborne departures and from arrivals through taxi and return to gate.

The Contractor will install approximately 38 sensors for full coverage of the airport surface at Miami International Airport as depicted in Appendix D. The Contractor will perform a preliminary siting analysis followed by a site visit and survey and engineering report to identify specific installation details, site preparation requirements, and other constraints for successful installation and deployment. The Contractor will provide the site engineering report to MDAD for review and approval. The Contractor will continue this process until sensors and equipment installation plans are in place that meet performance criteria necessary to support MDAD needs. The surveillance deployment process identified as Phase 2 will then move forward with covenants and site leases, site preparation, and equipment installation; concluding with system checkout, optimization, and transfer of title.

2.1.3. System Coverage Map

The Contractor will furnish MDAD a system coverage map detailing actual system coverage of all movement, non-movement, and terminal airspace areas along with the locations of all sensors and wireless nodes. Systems coverage and precision maps for surface area are included in Appendix D.

2.1.4. Acceptance

Acceptance of the SMS will take place after the successful completion of the Contractor's standard commercial Acceptance Test. The Contractor will submit a sample Service Acceptance Test (SAT) document. The Contractor will provide MDAD with a copy of the Acceptance Test for informational purposes thirty (30) days prior to executing the test. MDAD reserves the right to observe all testing.

3. **Design, Functional, and Operational Specifications of System**

3.1. **Surveillance Capabilities**

The coverage of MLAT is comprised of the airport surface, and will include all runways, taxiways, ramps, gates, and remote parking areas. Surveillance coverage will also include all aircraft arrivals and departures in the terminal airspace to a minimum distance of 5 nautical miles from the end of the runways. MLAT will ensure that aircraft with an active Mode S transponder in the ON position can be continuously tracked from the moment the aircraft pushes back from the gate, through the taxi to the runway, through the departure run and climb out, and into the cruise section of the flight.

3.2. **Cooperative Surveillance**

SMS will track aircraft when the Mode S transponder is active. The cooperative tracking will use the MLAT to track aircraft with an active Mode S transponder in all weather conditions.

3.3. **Surface Area Coverage**

The following surfaces area will be covered using multilateration surveillance:

a. Non-movement Gate Areas (Ramps and Gates)
b. Movement Areas (Runways and Taxiways)

3.4. **Precision of Surveillance Coverage**

a. SMS will provide coverage and precision in the above mentioned surface areas per Appendix D.
b. SMS will provide coverage and precisions in the airport terminal areas per Appendix D.
c. The County and Contractor recognize that although the Contractor guarantees the coverages listed in Appendix D, at time to time, due to the operational environment (building structure architecture) and the propensity for echoes of transponder signals and the occurrence of dynamic multipath (temporary line of sight interferences due to taxing), individual aircraft may temporarily (approximately less than 10 seconds) indicate their location as being different than the aircrafts actual location.

3.5. **Tracking Details**

SMS will provide continuous detection, identification, tracking, and display of all aircraft with an active Mode S or ADS-8 transponder and properly equipped vehicles (in all weather conditions) as follows:

a. All aircraft arrivals within the terminal airspace including aircraft holding patterns. Within 5 nautical miles of the ends of the runways, SMS will track all aircraft with update intervals of one second.
b. All aircraft departures within the terminal airspace. SMS will track all departing, airborne aircraft to a distance of approximately 5 nautical miles from the ends of the runways.
c. All movement areas (runways and taxiways) (as displayed on the system coverage maps in Appendix D). Movement area tracking will use the Saab's MLAT (cooperative) sensors.
d. All Non-movement gate areas (as displayed on the system coverage maps in Appendix D) will use Saab MLAT (cooperative) sensors.

3.6. **ADS-B Compliance**

All multilateration sensors will be capable of receiving ADS-8 signals from properly equipped aircraft.

3.7. **Overlapping Surveillance**

SMS will track all aircraft with active transponders while at the gate, under tow, and when the aircraft is under self-power. SMS will be designed to provide for overlapping coverage throughout the coverage area so that surveillance is always maintained.

3.8. **No Interference to Existing System**

SMS will not interfere with or degrade the performance of any FAA systems or other systems used at the airport.

3.9. **Manual Identification**

SMS will include the ability for a user to manually enter data to identify any unidentified targets located by the SMS through a graphical online capability.

3.10. **Future Expansion of Facility**

In the event that future airport construction impairs the coverage integrity of the MLAT, it may be necessary to install additional sensors to ensure proper coverage of the airport surface at Miami International Airport. The costs of such additional remote units and/or the movement of existing remote units necessary to provide coverage of the new terminal are not included under this Contract and will be handled as additional services. All additional services will be negotiated by the County and Contractor and incorporated into this Agreement via a Supplemental Agreement.

3.11. **Power and Network Connectivity**

Surveillance coverage, update rate and accuracy are dependent on the placement of the RUs and antennas in relation to the local topography. Shortly after contract execution, the Contractor will perform a Site Survey which is expected to identify the most favorable RU locations that yield the coverage, update rate, accuracy and redundancy required to meet the needs of MDAD. MDAD will aid Contractor in the completion of the survey, and provide guidance regarding airport construction plans for existing buildings, parking areas.

3.12. **FIDS Data**

SMS will use flight information display system (FIDS data), or other data sources as provided, as a source of parking gate information for flights. The FIDS Milestone shall consist of the Contractor configuring the SMS to use flight information display

system (FIDS data), or other data sources as provided, as a source of parking gate information for flights and submit the applicable Deliverable Acceptance Form to MDAD.

4. **Display and Playback Capabilities**

4.1. **2D Display and Playback**

SMS will provide a two-dimensional (2D) graphical display showing all aircraft under surveillance. Users can select segments of the airfield during all types of weather conditions. The display will be scalable (pan/zoom/rotate) to include the airfield and terminal airspace. Users will be able to view in real-time the movement areas, non-movement areas, and remote parking locations including the replay of historical events up to twenty-four (24) months. Replays will support playback speeds from 1x to 1Ox. The 2D display will show selected aircraft in a different color to indicate whether the aircraft is under an arrival, departure, or other type of operation (such as an aircraft being towed to a different gate or location, parked with no operating transponder, etc.). Replay will also allow the user to highlight an aircraft of interest.

4.2. **Screen Capture**

SMS will support recording of the screen display for playback as a movie. The movie format will be compatible with embedding features in Microsoft Office applications.

4.3. **Data Block**

SMS will allow configuration of the content of the aircraft data block to display the desired information as it is available to the SMS. The aircraft data block will be capable of displaying key aircraft and flight information including: aircraft carrier; flight number; aircraft type; destination city for departing flights; originating city for arriving flights; elapsed time for taxi times; scheduled departure runway; estimated time of arrival; estimated time of departure; and scheduled arrival gate. The aircraft data block can be individually toggled on or off. It will also support "mouse over' feature to allow expanded set of data for the aircraft without cluttering the display.

MDAD should also be able to enter free form text for an aircraft or equipped vehicle. Any additional requested custom interfaces not listed in this Scope of Work will be subject to a Supplemental Agreement. An example of a custom interface would be one to an individual airline flight planning system, not already built to a standard, or mutually agreed to, format.

4.4. **Aircraft Labeling**

SMS will allow MDAD to highlight certain aircraft as a priority or label the aircraft as a "follow me" aircraft.

4.5. **Operation Details**

SMS will allow MDAD to fully access details of its own operations including any affiliates' operations and those for which it has formal authorization, along with situational awareness of other operations on the airfield. MDAD, in coordination with the airlines, will configure user accounts regarding access to system information.

4.6. **Runway Configuration**

SMS will display current runway configurations, such as whether the airport is operating as an east or west operation. Runways will be designated as in use as a departure or arrival runway by color.

4.7. **Executive Dashboard**

SMS will allow MDAD to view a real-time snapshot summary of current airfield operations through an executive dashboard for such factors as arrival and departure rates, runway utilization, maximum/minimum taxi time, average taxi time, average delay time, and other key performance indicators. MDAD will be able to select the information to be displayed on the dashboard.

4.8. **Taxi Times**

SMS will calculate and display aircraft taxi times based on real-time airport operations. Taxi time calculations for each aircraft will include: from runway touchdown to the ramp; the ramp to the gate; the ramp to the taxiway; the taxiway to departure; total taxi time for each departing aircraft by runway.

5. **Operational System Alerts**

5.1. **MDAD Defined Alerts**

SMS will provide notifications of critical events. The alerts must be user definable, stored specifically for each user, and stored as a system alarm to run autonomously. Each alert condition that triggers a notification will be able to notify select users, groups of users, or all users. Critical alert conditions will include aircraft arrival at key locations (within the surveillance coverage area and as defined as a region of interest), arriving aircraft assigned to a currently occupied gate (based upon MDAD gate assignment data provided to the Contractor), and when taxi time exceeds a user-defined time.

5.2. **Notification Methods**

MDAD will be permitted to select the method of notification for each alert condition including on- screen display (with aircraft highlighting of the triggering aircraft), audible workstation alarm, and electronic methods to individuals or groups (e-mail, text message, etc.).

6. **General System Functions**

6.1. **Tactical and Strategic Predictions Methods**

For tactical planning, SMS will provide near-term predictions of departure sequences, times, queues, and delays for runways or other resources. For strategic planning, SMS will provide long-term forecasts of aggregate demand.

6.2. **Future Operation Predictions**

SMS will provide MDAD with tools to assist in the planning and scheduling of resources based on the current dynamics of the airfield and airspace. Aircraft arrival and departure decisions by airlines, ramp controllers, the FAA, and the airport will be supported by predictions of the airport surface.

6.3. **Landing Fee Revenue Management**

SMS will identify all landing activity for the calculation and billing of landing fees for all air carriers and any affiliates. The data for the previous day's landing activity will be available by 6 a.m. on the following day.

6.4. **Reports, Historical Data and Playback**

6.4.1.   Report Formats. The SMS is capable of producing reports in text, bar chart, pie chart, table and other formats using current or historical data.

6.4.2.   Ad-hoc Reports. The data can be sorted or filtered based on user preferences. Ad-hoc reports can be saved and run on a schedule.

6.4.3.   Data Export. Data can be exported from the SMS in compatible formats such as SAS, Microsoft Excel, Microsoft Access, and .xml in mutually agreed upon .xml schema.

6.4.4. Standard Reports. At a minimum, the SMS will include the following reports:
  a. Taxi Times
       i. From the runway to the ramp;
      ii. From the ramp to the gate;
     iii. From the runway to the gate;
      iv. From the gate to the taxiway;

       v. From the taxiway to the departure; and
      vi. From the gate to the departure
  b. Gate Occupancy Times
  c. Measurement of gate occupancy times will be dependent on the use of an operation transponder during the arrival and pushback.
  d. Airport Operational Data;
       i. Number of arrivals;
      ii. Number of departures;
     iii. Arrival rates; and
      iv. Departure Rates.
       v. Aircraft type
      vi. Number of seats
     vii. Aircraft Departure Taxi Times
    viii. By Airline;
      ix. By flight number;
       x. By destination airport; and
      xi. By location where a departure delay occurred (ramp, taxiway, etc.).
     xii. Aircraft Arrival Taxi Times
    xiii. By airline;
     xiv. By flight number;
      xv. By originating airport; and
     xvi. By location where the hold-out occurred (ramp, taxiway, etc.)

7. **Training**

7.1. **Types of Training**
The Contractor shall provide the following types of training at minimum:

7.1.1. System Administrator Training

This training will provide MDAD participants with the knowledge and skills to carry out SMS administrator functions. The training will cover topics including, but not limited to, managing all user accounts, performing all routine administrative functions, architecture and service overview, hands-on use of system Aerobahn service, accessing Customer Support, etc.

7.1.2. End User Training

This training will provide the participants with the knowledge and skills to use the SMS service. The training will cover topics including, but not limited to, access and view SMS data, generate reports, and logging issues in the on-line trouble ticket system.

7.1.3. Actual System Training

The training shall be conducted on the actual system implemented with all components of service available to MDAD users, both for end user and admin functions.

7.1.4.   Implementation Coordination

Training shall be coordinated and phased in concert with the implementation plan for the SMS service. The training shall be held as close as possible in time to system acceptance to maximize skill retention.

7.1.5.   Training Methodology

Training methodology shall include knowledgeable instructors, well-designed courseware, hands-on sessions on MDAD's computer network, and proper documentation.

7.1.6.   Train the Trainer

The Contractor will offer train-the trainer training to select MDAD users who can in tum train other users for both admin and end user functions.

7.1.7.   Training Plan

The Contractor will provide MDAD with a training plan at least 60 days prior to commencing the training sessions for approval by MDAD. This plan shall outline dates, course objectives, course descriptions, durations, and target audience.

7.1.8.   Acceptance Test Planning

All training will be conducted and completed prior to but no longer than 15 days from the start of acceptance testing.

7.1.9.   Training on Actual System

All training will take place on the actual system installed at the airport and in an MDAD furnished training room.

7.1.10.   Number of Attendees

The Contractor will provide training sessions for a maximum of 50 designated personnel prior to Service Commencement.

7.1.11.   Training Recurrence

The Contractor shall provide two recurrent training courses annually at a designated MDAD location. The purpose of this training will be to train any new users as well as any features in the system.

Documentation:
a.   The Contractor will provide full documentation of all system and sub-system components installed at the airport in three (3) sets, both in hardcopy and in electronic format (CD/DVD). The Contractor will furnish a "Systems Manual" that will include the following at a minimum:

   •   Installation Drawings
   •   Acceptance Test Plan with test results
   •   Training Manuals
   •   Manuals for each component of the system, showing the system layout and architecture and describing the function of each major item.
   •   All installed equipment inventory including spares
   •   Equipment Cut Sheets

b.   Contractor will provide MDAD with a certificate of the system installed and implemented.

8. **Ongoing Maintenance**

    8.1. **System Monitoring**

    Contractor's maintenance concept consists of continuous automatic system performance monitoring coupled with proactive/preventative checks to sense any degradation that could lead to a system performance issue on a 24 hours per day, 7 days per week, 365 days per year basis. If an outage is experienced, an automatic notification message is sent to a cell phone assigned daily to Contractor's support person. The support person is responsible for resolving related issues in accordance with the escalation matrix and reporting the status of maintenance actions to the MDAD Project Manager and Contractor's Customer Service. This approach, along with the redundant system architecture, provides significant fault tolerance to ensure high system availability. Contractor will monitor the SMS on a 24 hours per day, 7 days per week, 365 days per year.

    8.2. **Parts Replacement**

    Contractor will keep necessary spare parts inventory to provide the agreed upon uptime and service levels. Spare sensors, critical servers and any other network component that is vital for the uptime requirement will be staged at the airport for quick replacement to minimize impact to the service.

    8.3. **Routine Maintenance**

    Contractor will carry out all routine changes related to maintenance of the SMS (hardware and software) by following the change management process as approved in the Maintenance Plan agreed upon by the County and Contractor. Updates and maintenance that are not critical will be carried out only during off hours and in the approved maintenance windows.

    8.3.1. Emergency Maintenance. Any Maintenance that needs to be done urgently to restore a critical SMS failure can be carried out during regular hours after notification to MDAD.
    8.3.2. Service Restoration and Repair. Contractor will submit an escalation matrix showing escalation paths and time frames for resolution of issues. Contractor will clearly specify the process for reporting, tracking and resolution of problems experienced by MDAD users.

    In all cases, Contractor will coordinate with MDAD in advance of execution if on-site activities, and perform the maintenance on a day and time that will have minimal impact on operations.

    8.4. **Service Level**

    Per Appendix E, Contractor will provide a service level of 99.0% system availability or better.

    8.5. **Maintenance Plan**

    Contractor will submit a detailed Maintenance Plan for all hardware and software comprising the SMS, developed in cooperation with MDAD, and updated by Contractor as required over the life of the SMS. The Plan will include known constraints, and procedures to be followed in the event of an activity that has the potential to adversely impact SMS availability, outage or system degradation notification process, points of contact for outage or degradation reporting, escalation reporting, and guidelines for routine and emergency maintenance at minimum.

9. **Data Storage**

    SMS will retain data online for reports and playback for a two year rolling time period. Data will be retained offline for a maximum of five years and will be available by request to Contractor at no charge, in a mutually defined format and media. All SMS data will be stored in a secure, professionally managed, central database located off-site at the Contractor's data center.

10. <u>**Customer Service and Support**</u>

    10.1.**User Manuals**

    User manuals and other written training materials will be provided by Contractor to MDAD.

    10.2.**Group Meetings**

    Contractor will host periodic user group conferences, not to exceed 2 per year, to provide an opportunity for the sharing of information about the SMS. MDAD will participate in the technical interchange meetings to discuss any areas of concerns and associated issues.

    10.3.**Help Desk**

    All MDAD users will have immediate access to assistance from Contractor on a 24 hours per day, 365 days per year. Contractor's Customer Service provides a single point of contact for MDAD to:

    a. Report a Service outage;
    b. Report a Service degradation;
    c. Inquire about SMS functions and features; or
    d. Suggest new SMS features.

    Contractor's Customer Service shall be available 24x7 via toll-free telephone support or email. Telephone contacts are answered upon receipt and e-mail contacts are acknowledged within one business day. Details of the notification process are further defined in the Contractor's communications plan which shall be provided to the MDAD Program Manager upon execution of the Agreement, including process for tracking issues outside of Contractor's control, i.e. transponder reports, tailored training programs, data feed issue diagnosis, and issues outside of those listed above.

    10.4.**Direct End-User Support**

    Support requests from SMS users will be handled directly by Contractor. All administrative changes to the SMS that are requested by users will be confirmed with MDAD prior to making modifications.

    10.5.**Equipment Spares**

    A sufficient quantity of spare hardware equipment and replaceable(s) are maintained in the Contractor's Depot located in Syracuse, NY.

11. <u>**User Access and Information Security**</u>

    11.1.**System/Service Access**

    Contractor will provide access to the SMS for the number of users listed in Appendix B - Price Schedule via a secure login using Microsoft Windows based personal computers (PC). Contractor will not be responsible for providing PCs to the users. MDAD may create license pools from the total amount of available licenses. Contractor will limit the availability of license to certain license pools as designated by MDAD.

    Each license pool will have at least one super user with authority for user adds, moves, and changes. Contractor will configure the SMS such that MDAD can grant access to new users within one business day of the request.

    11.2.**Data Storage**

    All SMS data will be stored in a secure, professionally managed, central database located off- site at the Contractor data center. The SMS will retain data online for reports and playback for a two year rolling time period. Data will be retained offline for a

maximum of five years and will be available by request to Contractor's Customer Service at no charge, in Contractor defined format and media.

11.3.**Security**

11.3.1.   Authentication and Access. Contractor will implement industry standard Information Technology (IT) practices for computer and network security, including the use of firewalls, Intrusion Detection Systems (IDS), and both automatic and manual auditing. All network connectivity for the SMS will be protected and monitored. Security-in- depth will be addressed at many layers of the SMS architecture including the physical hardware layer, the network and communications layer, and the application layer. Only authorized personnel have access to the SMS via a password controlled login. Each airport user administrator will be able to manage their group's applications and content through the SMS. Contractor will assist the airport with user account adds, moves, and changes.

11.3.2.   Filtering. The SMS will filter the information available to each user based on SMS defined permissions. Also, the SMS will filter out all other competitive and performance information that is inappropriate to display. The SMS will ensure that only authorized users can access each organization's data via web service, reports, and queries. Access to proprietary, competitive data elements will be restricted to ensure that only MDAD or those approved by MDAD of a data element will be able to see the element User Profiles.

11.3.3.   Firewalls and Intrusion Detection. The External Security Posture will be implemented using IP firewalls. Every Linux host supporting the SMS uses IP tables to restrict untrusted access to internal resources. Every router will use Cisco IOS Firewall (K.9 pack) to restrict untrusted access to internal resources. All unauthorized access to the Aerobahn Application, Operating System, and Database will be logged and audited by Contractor's Engineers. The data transmitted between the Contractor's onsite servers and backend servers/data center will be secured using a secure, private non- Internet network.

11.4.**User Profiles**

The SMS will store preferences based on profile settings for users and will allow users to login at a later time or on a different workstation and fully access all previously set user settings. The SMS will allow the users to create a profile or workspace that will remain specific to each user and will be automatically displayed when that user logs in regardless of the machine.

11.5.**System Availability and Reliability**

The SMS will be designed with high level of redundancy and failover protection to provide high system availability and reliability.

11.5.1.   Architecture. The Contractor's architecture will ensure the delivery of service per the Service Level Availability defined in Appendix E.
11.5.2.   Disaster Recovery and Backup. The Contractor will regularly perform both system and database level backups to protect data against loss and for faster recovery in the event of system outage or data corruption. The Contractor will submit the Disaster Recovery Plan to MDAD during implementation.
11.5.3.   Automated, Proactive and Preventative Maintenance. Contractor will maintain high system reliability through Operation and Maintenance functions as described in the Documentation Section.
11.5.4.   The SMS will utilize UPS for all core equipment at the airport to maintain high system availability.